

**IN THE CLAIMS:**

1. (Currently Amended) A graphitized cathode block for aluminum refining with  
prepared from 15 to 100 wt % of calcined coke, characterized in that the calcined coke is  
prepared by coking and calcining after mixing heavy crude oil containing 10 to 25 wt % of  
quinoline insoluble with 3 to 20 wt % of carbon black and subsequently graphitized to provide a  
5 structure and density that provides improved resistance to abrasion loss during aluminum  
refining.
2. (Currently Amended) The graphitized cathode block for aluminum refining  
according to claim 1, wherein the heavy crude oil is coal tar pitch.
3. (Currently Amended) The graphitized cathode block for aluminum refining  
according to claim 1, wherein the heavy crude oil contains quinoline insoluble at 15 to 20 wt %.
4. (Currently Amended) The graphitized cathode block for aluminum refining  
according to claim 1, wherein the average particle diameter of the carbon black is more than 10  
nm.
5. (Previously Presented) A manufacturing process of a cathode block for aluminum  
refining by adding binder pitch to the mixture of 15 to 100 wt % of calcined coke and 0 to  
85 wt % of carbonaceous material, and then kneading, forming, baking and graphitizing, wherein  
the calcined coke is prepared by coking and calcining after mixing heavy crude oil containing 10  
5 to 25 wt % of quinoline insoluble with 3 to 20 wt % of carbon black.

6. (Currently Amended) The graphitized cathode block for aluminum refining according to claim 1 wherein the bulk density is less than  $1.62 \text{ g/cm}^3$  and the specific resistivity is greater than  $13 \mu\Omega\text{m}$ .

7. (Currently Amended) The graphitized cathode block for aluminum refining according to claim 1 wherein the cathode block is graphitized.

8. (Currently Amended) The graphitized cathode block for aluminum refining according to claim 7 wherein the cathode block is ~~formed into~~ in a cylinder shape.

9. (Currently Amended) The graphitized cathode block for aluminum refining according to claim 8 wherein the abrasion is less than 33% in volume when rotated in an alumina particle slurry at 240 rpm for a period of four hours.

10. (Previously Presented) A method of manufacturing a cathode block for use in aluminum refining comprising the steps of:

calcining a coke pre-form having a mixture of a heavy crude oil containing 10 to 25 wt % of quinoline insoluble and a carbon black, the carbon black being 3 to 20 wt % of the  
5 mixture;

crushing the calcined coke pre-form;

mixing the crushed calcined coke with a binder pitch and carbonaceous material;

forming a block of the mixture of calcined coke, carbonaceous material and  
binder pitch;

10 baking the block of calcined coke, carbonaceous material and binder pitch at a temperature between  $800^\circ$  to  $1300^\circ \text{ C}$  for at least 10 hours; and

graphitizing the baked block at a temperature between 2400° to 3000° C for at least 5 hours.

11. (Previously Presented) The method of manufacturing of claim 10 further including cutting the cathode block into a cylinder.

12. (Previously Presented) The method of manufacturing of claim 10 wherein the mixture of crushed calcined coke, binder pitch and carbonaceous material is kneaded at a temperature in the range of 120° C to 150° C before being formed into a block.

13. (Previously Presented) The method of manufacturing of claim 10 wherein calcining is performed at a temperature range of 1300° C to 1500° C for a time period of 1 to 3 hours.

14. (Previously Presented) The method of manufacturing of claim 10 wherein the carbon black is within a range of 3 to 5 wt % and the quinoline insoluble is within a range of 15 to 20 wt %.

15. (Previously Presented) The method of manufacturing of claim 14 wherein an average particle diameter of the carbon black is between 10 nm and 100 nm.

16. (Previously Presented) The method of manufacturing of claim 15 wherein iodine adsorption is less than 100 mg/g of carbon black.

17. (New) The method of manufacturing of claim 10 wherein the calcined coke and carbonaceous material are mixed with 24 wt % of binder pitch.

18. (New) The method of manufacturing of claim 10 wherein the mixture of crushed calcined coke, binder pitch and carbonaceous material is kneaded at a temperature of 130° C before being formed into a block.

19. (New) The method of manufacturing of claim 10 wherein the block of calcined coke, carbonaceous material and binder pitch is baked at 1200° C for 40 hours.

20. (New) The method of manufacturing of claim 10 wherein the baked block is graphitized at 2900° C for 15 hours.

21. (New) A graphitized cathode block for aluminum refining is prepared with 15 to 100 wt % of calcined coke, and characterized in that the calcined coke is prepared by coking and calcining after mixing heavy crude oil containing 10 to 25 wt % of quinoline insoluble with 3 to 20 wt % of carbon black, after graphitizing, the graphitized cathode block has a resulting structure and density to exhibit an abrasion loss of material of less than 33% in volume when subject to an abrasion test of rotation in an aluminum particle slurry at 240 rpm for a period of four hours.

22. (New) The graphitized cathode block of Claim 21 wherein a bulk density of the graphitized cathode block is 1.58 g/cm<sup>3</sup>.

23. (New) The graphitized cathode block of Claim 22 wherein the volume of abrasion loss is 28%.